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ABSTRACT

Colleges and universities are having to design instructional formats for both traditional and nontraditional, second career individuals. To compare the learning styles and other related educational factors (e.g., test preferences, educational goals) of traditional and nontraditional students at the University of Akron (Ohio), 154 traditional students, aged 18 to 25, and 84 nontraditional students, aged 50 and over, completed Kolb's Learning Style Inventory, a general questionnaire on behaviors required in higher education, and a demographic information sheet. An analysis of the results showed no significant interaction between the traditional and nontraditional groups and learning style, i.e., learning style was not dependent on age in predicting questionnaire responses. However, learning styles and questionnaire responses significantly discriminated between the two groups, in that nontraditional students displayed more determination and certainty, handled classroom assignments with ease, and responded more favorably to brainstorming sessions than did traditional students. (Numerous tables present the results.) (BL)

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# COMPARATIVE STUDY OF LEARNING STYLES AND RELATED FACTORS BETWEEN TRADITIONAL AND NONTRADITIONAL STUDENTS AT THE UNIVERSITY OF AKRON

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## PROCEDURES

The problem of this study is to compare older "nontraditional" students with younger "traditional" students on the campus of The University of Akron, in terms of their styles of learning and other selected variables such as type of test preferences and educational goals.

### Setting

The University of Akron, established in 1870, is a comprehensive state-assisted urban university with national and international influence and sharing the same general mission as the other urban state universities. The university is located in a large metropolitan area of 1.5 million persons. More than 24,000 students from 32 states and 60 foreign countries are currently attending day or evening classes for academic credit, and an additional 7,000 students participate in "informal" noncredit classes.

### Population

For this study, two test groups were used from within the undergraduate student population: traditional

students, ages 18-25; and nontraditional students, ages 50 and older. For the traditional group a large general studies lecture class, with an enrollment of 185 students, was chosen for the required testing. This particular class met the requirements for the study: a representative group from all colleges was present, the age requirements of 18-25 were met, and all participants had completed one or more semesters prior to the current semester. The instrument was administered on Tuesday, April 6, 1982, to the 168 students present. Fourteen of these tests were excluded because the respondents exceeded the age limit established for traditional students in the study.

Nontraditional students in the age bracket selected were not as numerous as traditional students. A complete listing of the names, addresses, and telephone numbers of students aged 50 and older was acquired from the office of the Registrar; there were 191 on the list.

The list was quickly reduced by 30 as these students did not meet the limitations of this study, i.e., they had not completed their first semester. Of the remaining 161 names, 11 students had not recorded a telephone number. Letters were mailed to each potential participant (see Appendix B). The letters contained an overview of the study, a brief description of the test and surveys involved, and an invitation to participate.

The letter also stated that they would be contacted by telephone to verify their decision to participate or not participate in the study, and if they expressed a willingness to participate, a definite time would be established for the testing.

The 11 potential participants without telephone numbers received the same letter but with an additional note indicating the inability to contact each one by telephone and asking for their response to be returned in the enclosed stamped, addressed envelope. Not one response was received from these 11 participants. Of the remaining 150 students contacted by letter and telephone, 84 students responded and were tested.

## Instruments

Three instruments were used in this study

The first instrument is the Learning Style Inventory (LSI) developed by David A. Kolb and published by McBer and Company. The Learning Style Inventory was created to measure the individual learning styles derived from experiential learning theory. The particular form of the inventory was determined by three design objectives. First, the test should be brief and straightforward so that in addition to research uses it could be used as a means of discussing the learning process with individuals and giving them feedback on their own learning

style. Secondly, the test should be constructed in such a way that an individual would respond to it in somewhat the same way as they would a learning situation; that is, it should require them to resolve the opposing tensions between abstract-concrete and active-reflective orientations. Third, and most obviously, it was hoped that the test would be valid in that the measures of learning styles would predict behavior in a way that was consistent with the theory.

The final form of the test is a nine-item self-description questionnaire. Each item asks the respondent to rank-order four words in a way that best describes their learning style. One word in each item corresponds to one of the four learning modes--Concrete Experience (sample word feeling), Reflective Observation (watching), Abstract Conceptualization (thinking), and Active Experimentation (doing).

The LSI measures an individual's relative emphasis on four learning abilities--Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE)--plus two combination scores that indicate the extent to which an individual emphasizes abstractness over concreteness (AC-CE) and the extent to which an individual emphasizes action over reflection (AE-RO) (Kolb, 1976, p. 1). Despite its simplicity, this commercially available self-testing/

instrument is used for adults by business management and training concerns.

This instrument has been used in recent studies (Pigg, Busch, & Lacey, 1980; Strange, 1978). Strange evaluated Kolb's instrument by stating:

> If colleges and universities are to continue to develop environments where learning is more than the accumulation of academic credits, further research on experimental learning styles and the theoretical model developed by Kolb and his associates could prove to be a useful source of information toward that end. (p. 156)

Pigg et al. (1980) suggested:

> Despite the cautions against utilizing inventories such as Kolb's for developing educational programs, the Learning Style Inventory does appear to be a useful instrument. A number of individuals, including these researchers, have reported that the inventory really captured tendencies in their personal learning behavior. Being able to recognize these tendencies, and relate them to behavior patterns is important. Thus, it is concluded that the LSI may be effectively employed as a useful device in the actual conduct of educational programs or in a participatory approach to the development of adult education programs due to its high degree of face validity. (p. 243)

The LSI was selected for use because it was adult-oriented.

The second instrument is a general questionnaire designed to identify the student's individual responses to a variety of behaviors required in higher education. Questions regarding achievements, projected future goals, test preferences, and the typical demands of courses were devised. Students' suggestions and responses were sampled and carefully read and evaluated in order to develop valid

thoughtful questions for the questionnaire. Each time a new questionnaire was developed it was distributed among carefully selected university faculty members for their personal evaluation. This process was repeated 14 times until a consensus was reached for the effective and useful questionnaire, which included 23 questions.

The third instrument is a demographic survey administered to collect data for analysis and to make certain the students responding to the second instrument do, in fact, fall within the scope of this investigation. Demographic data collected included age, sex, marital status, employment, and years of education.

Reliability Estimates on the LSI

Results of the split-half reliability test ranged from .55 to .82 across the four subscales--Concrete Experience (CE), Abstract Conceptualization (AC), Active Experimentation (AE), and Reflective Observation (RO)--on data from five samples (see Table 1). The fact that the CE scale shows the lowest and most variable coefficients across populations may also suggest that the Learning Style Inventory (LSI) is somewhat biased against obtaining accurate measurements of the CE orientations. The test itself is an active abstract task and thus a concrete person must have some abstract/active abilities in order to accurately communicate their orientation.

> been inadequately conceptualized, and insufficient research findings are available to clarify the expected results of various instructional designs on selected populations of older people. The older people differ significantly. Their wide range of ability, experience, and preferred learning style requires that consideration of individual differences in instruction be incorporated into the planning of instruction. (pp. 57-58)

Concern for adult learners is not a new endeavor. Twenty-five years ago, Belbin (1958) stated:

> When groups, such as older workers . . . have difficulty in learning particular tasks, we may find that is not a specific skill that cannot be acquired at all, but rather that it could be learned only if we found methods of teaching based on the previous learning experiences of the people concerned. (p. 220)

## Learning Styles and Academic Specialization

One concentration on the Experiential Learning Theory of Career Development is the close association between each individual's chosen career and their respective learning style. The available data indicate that undergraduate education is a factor in the development of an individual's learning style (Kolb, 1976).

## Data Collection

### Traditional Students

A large lecture class in general studies was selected to provide traditional students for testing. This class had an enrollment of 185 students, of which

168 were present and participated in the testing. Later, 14 of these 168 tests were set aside because the students were over the age limit established for traditional students in this study, leaving a total of 154 traditional students tested. The instruments were administered and data collected on Tuesday, April 6, 1982.

The instructions for the test and the surveys were carefully read and explained twice before they were distributed. Three instruments--the Learning Style Inventory, a general questionnaire, and a demographic information sheet--were administered. Immediately following the distribution of the tests, attention was called to the printed instructions on the tests. The printed directions were used as a point of reference for the remainder of the instruction period and during the test-taking procedure. Questions during the testing and surveying time were answered using the printed instructions as a guide

Nontraditional Students

The nontraditional students who were examined in this study were contacted initially by mail. Each received a letter (see Appendix B) containing an overview of the study, a brief description of the test and surveys involved, and an invitation to participate. The letter also stated that they would be contacted by telephone to

verify their decision to participate or not participate in the study, and if they expressed their willingness to participate, a definite time was established for the testing to be held on the campus of The University of Akron.

Eighty-four students responded and were tested individually and surveyed by this researcher in room 214 Schrank Hall South on the University campus. A prearranged schedule of specific days and times was established to coincide with the school schedules of the nontraditional students.

## Limitations

The study was limited by several factors. The generalizability of the study may be limited because one general studies class (Western Culture) was chosen for testing traditional students as representative of all the colleges within the university. A specific time and place was designated for individual testing of the nontraditional students enrolled in undergraduate programs on the campus of The University of Akron. Therefore, testing was available for three weeks (April 12 to April 30, 1982), Monday through Thursday, 8:00 A.M. - 8:00 P.M., and Friday, 8:00 A.M. - 4:00 P.M. The participants made their own decision to participate in the study.

Some nontraditional students admitted that they were not familiar with the campus layout and were reluctant

to search for the building where their testing was to be conducted. Some of them eventually had to be contacted at a location with which they were already familiar and escorted to the testing site.

## List of Variables

### Independent Predictor Variables

$X_1$ = traditional student

$X_2$ = nontraditional student

$X_3$ = converger learner

$X_4$ = diverger learner

$X_5$ = assimilator learner

$X_6$ = accommodator learner

### Dependent Criterion Variables

Method of evaluation: 1-5 rating scales

1 - definitely no
2 - moderately no
3 - not sure
4 - moderately yes
5 - definitely yes

$X_7$ = Item 1: Is your goal to complete the course requirements for a degree?

$X_8$ = Item 2: Are you satisfied with your progress in the program you have chosen?

$X_9$ = Item 3: Do your class assignments require an excessive amount of time?

$X_{10}$ = Item 4: Are your assignments realistic for your needs and expectations?

$X_{11}$ = Item 5: Do you find Bierce Library a valuable resource for information for your assignments?

$X_{12}$ = Item 6: Do you react negatively to working several hours at the library?

$X_{13}$ = Item 7: Are you finding due dates for class assignments difficult to meet?

$X_{14}$ = Item 8: Do you actively participate in class discussions?

$X_{15}$ = Item 9: Do you prefer true and false test questions?

$X_{16}$ = Item 10: Do you prefer multiple choice test questions?

$X_{17}$ = Item 11: Do you prefer essay test questions?

$X_{18}$ = Item 12: Do you enjoy being involved in a brainstorming session?

$X_{19}$ = Item 13: Do you think higher education will prepare you to use your particular abilities?

$X_{20}$ = Item 14: Is your program helping you to better understand yourself?

$X_{21}$ = Item 15: Do you feel you are pursuing a program that is preparing you for an environment where you can be creative and original?

$X_{22}$ = Item 16: Is your program broadening your outlook and experiences?

$X_{23}$ = Item 17: Do your plans for the future include taking advanced courses at The University of Akron?

$X_{24}$ = Item 18: Are you preparing for a possible career change in the near future?

$X_{25}$ = Item 19: What is your reaction to the mix of older and younger students in many of the classes?

$X_{26}$ = Item 20: Should the older (nontraditional) students be in separate classes?

$X_{27}$ = Item 21: Are you satisfied with your decision to attend classes at The University of Akron?

$X_{28}$ = Item 22: Would you recommend the learning opportunities available at The University of Akron?

$X_{29}$ = Item 23: Do you find the instructors and professors helpful?

Because this study is investigating nontraditional and traditional students with different learning styles, interactive variables will have to be used. This is a 4 x 2 interaction as depicted in the following:

| | $X_3$ converger | $X_4$ diverger | $X_5$ assimilator | $X_6$ accommodator |
|---|---|---|---|---|
| $X_1$ nontraditional | $X_{30}$ | $X_{31}$ | $X_{32}$ | $X_{33}$ |
| $X_2$ traditional | $X_{34}$ | $X_{35}$ | $X_{36}$ | $X_{37}$ |

Therefore, $X_{30}$ . . . $X_{37}$ are the generated interactions. If there is no significant interaction, then whether one is a traditional or nontraditional student is not dependent on learning style in predicting educational preferences, i.e., questionnaire responses.

## Data Collection

### Nontraditional Students

The nontraditional students participating in the study were tested and surveyed individually on a self-selected day and time. The testing site was room 214, Shrank Hall South, on the university campus. There were 84 nontraditional students from a pool of 150; this represented a response rate of 56%.

### Traditional Students

A large, general studies lecture class, with an enrollment of 185 students, was chosen for the required testing. This particular class met the two requirements for this study. Of the 185 enrolled students, 168 attended class the day of the testing. However, 14 of the tests were excluded because the participants exceeded the age limit established for traditional students in this study. Therefore, 154 students participated in the testing; this represented a response rate of 91%.

## Learning Styles

Responses of 238 students were scored according to test instructions. Of the 154 traditional students, 62 (40.2%) were classified as assimilator learners. They are "thinker-watchers." However, other descriptive terms

are used, too, i.e., "logical" (Hagberg & Leider, 1978), and "logical thinker" (Jung, cited in Fordham, 1966).

> Assimilators are best at taking in data and devising theoretical models. They are also very good at inductive reasoning, and in bringing together different observations into an integrated explanation.
>
> They differ from Convergers in being less concerned with the practical use of theories. Otherwise, both styles tend to be abstract and less people-oriented than the others. (Kirby, 1979, p. 77)

In second place, 59 (38.3%) of the traditional students, were classified as diverger learners. They are "feeler-watchers." However, other descriptive terms are used, i.e., "imaginative" (Hagberg & Leider, 1978) and "feeler" (Jung, cited in Fordham, 1966). According to Kirby (1979):

> These people are the exact opposite of Convergers. They look at everything from many perspectives and organize them into a meaningful "gestalt." They are imaginative and often excel as "brainstormers." They are artistically inclined, having broad cultural interests, and often specialize in the arts.
>
> Divergers tend to be emotional, and they like working with ideas such as the humanities and liberal arts, or possibly counseling, organization development consulting, or personnel. (p. 76)

In third place, 19 (12.3%) of the traditional students, were classified as converger learners. They are "thinker-doers." However, other descriptive terms may be substituted, i.e., "practical" (Hagberg & Leider, 1978) and "senser" (Jung, cited in Fordham, 1966).

> Convergers seem to do best in the situations like conventional intelligence tests, where there is just one right answer or just one solution to a problem. They can focus on specific problems through hypothetical-deductive reasoning. (p. 76)

Convergers are rather unemotional, and prefer to deal with things rather than people. They tend to have narrow interests. Their specialization is often in the physical sciences; engineering is a popular vocational choice among convergers (Kirby, 1979).

Lastly, 14 (9.0%) of the traditional students, were classified as accommodator learners. They are "feeler-doers." However, other descriptive terms can be substituted, i.e., "enthusiastic" (Hagberg & Leider, 1978) and "intuiter" (Jung, cited in Fordham, 1966). Kirby (1979) stated:

> Accommodators are so called because they do well in situations where they must accommodate themselves to the circumstances. If their theories or plans don't fit the facts, they will probably discard them and seek a different approach (just the reverse from the Assimilator). They take more risks than the other three learning-style types as they capitalize on their greatest asset: carrying out plans and experiments, getting involved in new experiences and solving problems on a trial-and-error basis.
>
> In this active experiencing, Accommodators tend to rely on other people for information to a great extent, rather than their own analytic ability. Accommodators like people and are at ease with them, but can sometimes seem impatient and demanding. It is not surprising to find them in technical or practical fields such as business--more specifically, in action-oriented jobs such as marketing or sales. (p. 77)

Detailed resulted appear in Table 7.

Table 7

Types of Learning Styles in Both Groups: Traditional and Nontraditional Students

| Learning Style | Traditional Students | Nontraditional Students |
|---|---|---|
| Converger Learner | 19 (12.3%) | 11 (13.0%) |
| Diverger Learner | 59 (38.3%) | 34 (40.4%) |
| Assimilator Learner | 62 (40.2%) | 12 (14.2%) |
| Accommodator Learner | 14 (9.0%) | 27 (32.1%) |
| Total | 154 (100%) | 84 (100%) |

Of the 84 nontraditional students, 34 (40.4%), were classified as diverger learners. In second place, 27 (32.1%) of the nontraditional students, were classified as accommodator learners. The next group, 12 (14.2%) of the nontraditional students, were classified as assimilator learners. The final group (11 (13.0%) of the nontraditional students, were classified as converger learners.

## Demographic Characteristics

### Males vs. Females

Table 8 shows the proportion of males and females among the traditional and nontraditional students participating in this study. Of the group of 154 traditional students responding, 39, or 25.3%, were male; and 115, or 74.6%, were female. This is roughly a 1:3 ratio; for every male student, there were three female students. Of the group of 84 nontraditional students responding, 12, or 14.2%, were male; and 72, or 85.7%, were female. This is a ratio of 1:6; for every one male student, there were six female students.

Table 8

Number of Males vs. Females in the Traditional and Nontraditional Student Groups

| Group | Traditional[a] | | Nontraditional[b] | |
|---|---|---|---|---|
| | N | % | N | % |
| Males | 39 | 25.3% | 12 | 14.2% |
| Females | 115 | 74.6% | 72 | 85.7% |

[a] $N = 154$.
[b] $N = 84$.

## Marital Status

Table 9 shows the relative distribution of the traditional and nontraditional students among five categories of marital status. Of the 154 traditional students participating, 149, or 96.7%, were single; 3, or 1.9%, were married; 2, or 1.3%, were divorced; and none were widowed or separated. Of the nontraditional students participating, 8, or 9.6%, were single; 53, or 63%, were married; 9, or 10.7%, were widowed; 14, or 16.6%, were divorced; and none were separated.

Table 9

Distribution of Traditional and Nontraditional Students Among Five Categories of Marital Status

| Category | Traditional | | Nontraditional | |
|---|---|---|---|---|
| | N | % | N | % |
| Single | 149 | 96.7% | 8 | 9.5% |
| Married | 3 | 1.9% | 53 | 63.0% |
| Widowed | 0 | 0% | 9 | 10.7% |
| Divorced | 2 | 1.3% | 14 | 16.6% |
| Separated | 0 | 0% | 0 | 0% |
| | 154 | 100.0% | 84 | 100.0% |

## Age

The delimitations of the study stated in part that the ages of the traditional students will be limited to 18-25 years, and the ages of the nontraditional students will be limited to age 50 and older. Table 10 gives the range of ages of the traditional and nontraditional students.

## Number of Children

Of the 154 traditional students, three said they were married and two of the three indicated they each had one child. Of the 84 nontraditional students, 74 indicated they had children; a total of 254 children were identified with these 74 students.

## Income

Traditional as well as nontraditional students were reluctant to answer the questions concerning yearly income. An assortment of answers was given, i.e., no comment, do not know, personal information, and rather not comment.

## Formal Education

Table 11 compares the amount of formal education possessed by members of the traditional and nontraditional

Table 10

Range of Ages for Traditional and Nontraditional Students

| Traditional | | | Nontraditional | | |
|---|---|---|---|---|---|
| Age | Number | % | Age | Number | % |
| 18 | 37 | 24.6 | 50 | 18 | 21.4 |
| 19 | 69 | 44.8 | 51 | 9 | 10.7 |
| 20 | 23 | 14.9 | 52 | 12 | 14.2 |
| 21 | 10 | 6.4 | 53 | 5 | 5.9 |
| 22 | 6 | 3.8 | 54 | 8 | 9.5 |
| 23 | 7 | 4.5 | 55 | 8 | 9.5 |
| 24 | 2 | 1.2 | 56 | 3 | 3.6 |
| 25 | 0 | 0 | 57 | 3 | 3.6 |
| | | | 58 | 5 | 5.9 |
| | 154 | 100.0% | 59 | 3 | 3.6 |
| | | | 60 | 3 | 3.6 |
| | | | 61 | 1 | 1.1 |
| | | | 62 | 1 | 1.1 |
| | | | 63 | 1 | 1.1 |
| | | | 64 | 0 | 0.0 |
| | | | 65 | 0 | 0.0 |
| | | | 66 | 0 | 0.0 |
| | | | 67 | 0 | 0.0 |
| | | | 68 | 1 | 1.1 |
| | | | 69 | 0 | 0.0 |
| | | | 70 | 2 | 2.3 |
| | | | 71 | 0 | 0.0 |
| | | | 72 | 0 | 0.0 |
| | | | 73 | 0 | 0.0 |
| | | | 74 | 1 | 1.1 |
| | | | | 84 | 100.0% |

Table 11

Comparison of Years of Formal Education
Between the Traditional and
Nontraditional Groups

| Years | Traditional | | Nontraditional | |
|---|---|---|---|---|
| | N | % | N | % |
| 12.5 years | 17 | 11.0% | 9 | 10.7% |
| 13 years | 84 | 54.5% | 14 | 16.6% |
| 14 years | 30 | 19.4% | 26 | 30.9% |
| 15 years | 10 | 6.4% | 14 | 16.6% |
| 16 years | 9 | 5.8% | 12 | 14.2% |
| 17 years | 4 | 2.5% | 6 | 7.1% |
| 18 years | 0 | 0.0% | 2 | 2.3% |
| 19 years | 0 | 0.0% | 0 | 0.0% |
| 20 years | 0 | 0.0% | 1 | 1.1% |
| Total | 154 | 100.0% | 84 | 100.0% |

groups, assuming that all participants are high school graduates or the equivalent. Not surprisingly, inasmuch as the questionnaire was administered to the traditional student group in a class that was usually taken soon after entering the university, a significantly larger percentage of traditional than nontraditional students was found to have 12.5 or 13 years of schooling. Of the traditional students, 17, or 11%, had 12.5 years; and 84, or 54.5%, had 13 years, while among the nontraditional students those two categories contained only 9 and 14 students, or 10.7% and 16.6%, respectively.

Relatively larger percentages of nontraditional students had 14, 15, and 16 years of schooling: 26, or 30.9%; 14, or 16.6%; and 12, or 14.2%, compared with 30, 19.4%; 10, 6.4%; and 9, 5.8%, among the traditional students. At the 16-year and 17-year levels, nontraditional students still outnumbered traditional students, as expected. The proportions were 12 (14.2%) and 6 (7.1%) to 9 (5.8%) and 4 (2.5%). There were no traditional students with 18, 19, or 20 years, and among the nontraditional group only 2 (2.3%) at the 18-year level, none with 19 years, and a single student (1.1%) with 20 years of schooling.

## Financial Assistance

Table 12 examines financial assistance, whether or not any is received, the type of aid received, and the differences between the traditional and nontraditional groups in this area. The most obvious difference is that 107 traditional students, or 69.4% of the total group of 154, received some sort of financial assistance, compared to 63, or 25%, of the nontraditional group. The traditional students who had taken out loans outnumbered nontraditional students 40 (25.9%) to 8 (9.5%); and the number of those who had received grants was similarly higher, 38 traditional to 7 nontraditional, or 24.6% to 7.1%. Finally, 29 traditional students were attending classes on scholarships, a total of 18.8% to 6 students or 7.1% of the nontraditional group. Of those reporting receiving financial assistance, 28 or 18.1% indicated they were receiving from more than one source; nontraditional students did not report additional assistance.

## Employment Status

Table 13 compares and contrasts the employment status of the members of the traditional and nontraditional groups. Predictably, nontraditional students vastly outnumber their traditional counterparts among the full-time work force: 37 nontraditional students, or

Table 12

Types of Financial Assistance Utilized by the Traditional and Nontraditional Students

| Category | Traditional | | Nontraditional | |
|---|---|---|---|---|
| | N | % | N | % |
| Loan | 40 | 25.9% | 8 | 9.5% |
| Grant | 38 | 24.6% | 7 | 8.3% |
| Scholarship | 29 | 18.8% | 6 | 7.1% |
| None | 47 | 30.5% | 63 | 75.0% |
| | 154 | 100.0% | 84 | 100.0% |

Table 13

Employment Status of the Traditional and Nontraditional Students

| Category | Traditional | | Nontraditional | |
|---|---|---|---|---|
| | N | % | N | % |
| Full-Time | 10 | 6.0% | 37 | 4.4% |
| Part-Time | 93 | 60.3% | 7 | .8% |
| Retired | 0 | 0.0% | 12 | 1.4% |
| Homemaker | 3 | 1.9% | 34 | 4.0% |
| Volunteer Work | 0 | 0.0% | 8 | 9.0% |
| Full-Time Student | 73 | 47.4% | 3 | 3.0% |

40.4%, of the test group, were employed full-time, but only 10, or 6%, of the traditional students. Similarly, 73 traditional students listed their occupation as full-time student, a total of 47.4% of the group, compared to only 3 and 3% of the nontraditional group. Many more traditional than nontraditional students were employed part-time, however, 93 (60.3%) to 7 (.8%). There were, by definition, no traditional students who were retired. Of the nontraditional students, 1.4%, or 12 students in all, were retired. Nontraditional students outnumbered traditional students 34 to 3, or 4.9% to 1.9%, in the category of homemaker; and 8 nontraditional students, or 9%, said they did volunteer work, while none was reported among the traditional group.

## Data Information on Questionnaire Items

The differences of the means of the responses of traditional and nontraditional students to the questions were very small. Tables 14 and 15 present the frequency responses to the questionnaire items by the traditional and nontraditional students.

An examination was made of the tabulated results of two areas of the questionnaire from the two identified groups. The two questionnaire areas were definitely no and definitely yes.

Table 14

Frequency of Response to Questionnaire Items
by Traditional Students
(N = 154)

| Item | Definitely No | Moderately No | Not Sure | Moderately Yes | Definitely Yes | $\bar{X}$ |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| 1 | 2 (1.2%) | 5 (3.2%) | 2 (1.3%) | 28 (18.2%) | 117 (75.9%) | 4.64 |
| 2 | 5 (3.2%) | 17 (11.0%) | 21 (13.6%) | 80 (51.9%) | 31 (20.1%) | 3.77 |
| 3 | 2 (1.2%) | 34 (22.0%) | 14 (9.0%) | 68 (44.0%) | 36 (23.3%) | 3.69 |
| 4 | 2 (2.2%) | 25 (16.2%) | 31 (20.0%) | 78 (50.6%) | 18 (11.6%) | 3.55 |
| 5 | 6 (3.8%) | 18 (11.6%) | 29 (18.8%) | 57 (37.0%) | 44 (28.5%) | 3.76 |
| 6 | 37 (24.0%) | 63 (40.9%) | 16 (10.3%) | 25 (16.2%) | 13 (8.4%) | 2.44 |
| 7 | 38 (24.6%) | 90 (58.4%) | 2 (1.2%) | 20 (12.9%) | 4 (2.5%) | 2.12 |
| 8 | 7 (4.5%) | 30 (19.4%) | 16 (10.3%) | 67 (43.5%) | 34 (22.0%) | 3.59 |
| 9 | 51 (33.1%) | 41 (26.6%) | 19 (12.3%) | 29 (18.8%) | 14 (9.0%) | 2.45 |
| 10 | 3 (1.9%) | 12 (7.7%) | 5 (3.2%) | 88 (57.0%) | 46 (29.8%) | 4.05 |
| 11 | 47 (30.5%) | 41 (26.6%) | 17 (11.0%) | 37 (24.0%) | 12 (7.7%) | 2.48 |
| 12 | 16 (10.3%) | 20 (12.9%) | 52 (33.7%) | 41 (26.6%) | 25 (16.2%) | 3.25 |
| 13 | 2 (1.2%) | 2 (1.2%) | 20 (12.9% | 60 (38.9%) | 70 (45.0%) | 4.20 |
| 14 | 5 (3.2%) | 12 (7.7%) | 32 (20.7%) | 71 (46.0%) | 34 (22.0%) | 3.75 |
| 15 | 3 (1.9%) | 15 (9.7%) | 20 (13.0%) | 63 (41.0%) | 54 (34.4%) | 3.99 |
| 16 | 0 | 7 (4.5%) | 11 (7.0%) | 65 (42.2%) | 71 (46.0%) | 4.27 |
| 17 | 18 (11.6%) | 18 (11.6%) | 59 (38.0%) | 29 (18.8%) | 30 (19.4%) | 3.19 |
| 18 | 49 (31.8%) | 42 (27.2%) | 32 (20.7%) | 13 (8.4%) | 18 (11.6%) | 2.41 |
| 19 | 4 (2.5%) | 1 (.6%) | 33 (21.4%) | 46 (29.8%) | 70 (45.4%) | 4.14 |
| 20 | 107 (69.4%) | 34 (22.0%) | 8 (5.1%) | 3 (1.9%) | 2 (1.2%) | 1.44 |
| 21 | 6 (3.8%) | 5 (3.2%) | 17 (11.0%) | 77 (50.0%) | 48 (31.1%) | 4.00 |
| 22 | 5 (3.2%) | 3 (1.9%) | 21 (13.6%) | 72 (46.7%) | 53 (34.4%) | 4.06 |
| 23 | 4 (2.5%) | 18 (11.6%) | 26 (16.8%) | 86 (55.8%) | 20 (12.3%) | 3.68 |

Table 15

Frequency of Responses to Questionnaire Items
by Nontraditional Students
(N = 84)

| Item | Definitely No | Moderately No | Not Sure | Moderately Yes | Definitely Yes | $\bar{X}$ |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| 1 | 6 (7.1%) | 4 (4.7%) | 7 (8.3%) | 12 (14.2%) | 55 (65.4%) | 4.23 |
| 2 | 3 (3.5%) | 4 (4.7%) | 6 (7.1%) | 29 (34.5%) | 42 (50.0%) | 4.26 |
| 3 | 5 (5.9%) | 20 (23.8%) | 7 (8.3%) | 36 (42.8%) | 16 (19.0%) | 3.38 |
| 4 | 3 (3.5%) | 9 (10.7%) | 11 (13.0%) | 31 (36.9%) | 30 (35.7%) | 3.77 |
| 5 | 7 (8.3%) | 7 (8.3%) | 13 (15.4%) | 24 (28.5%) | 33 (39.0%) | 3.80 |
| 6 | 34 (40.4%) | 19 (22.6%) | 8 (9.5%) | 13 (15.4%) | 10 (11.9%) | 2.31 |
| 7 | 31 (36.9%) | 22 (26.1%) | 3 (3.5%) | 22 (26.1%) | 6 (7.1%) | 2.36 |
| 8 | 0 | 5 (5.9%) | 6 (7.1%) | 21 (25.0%) | 52 (61.9%) | 4.38 |
| 9 | 24 (28.5%) | 15 (17.8%) | 11 (13.0%) | 21 (25.0%) | 13 (15.4%) | 2.73 |
| 10 | 6 (7.1%) | 11 (13.0%) | 7 (8.3%) | 34 (40.4%) | 26 (30.9%) | 3.73 |
| 11 | 18 (2.1%) | 25 (29.7%) | 9 (10.7%) | 15 (17.8%) | 17 (20.0%) | 2.71 |
| 12 | 4 (4.7%) | 8 (9.5%) | 13 (15.4%) | 24 (28.5%) | 35 (41.6%) | 3.93 |
| 13 | 2 (2.3%) | 1 (1.1%) | 10 (11.9%) | 27 (32.0%) | 44 (52.0%) | 4.32 |
| 14 | 4 (4.7%) | 3 (3.5%) | 10 (11.9%) | 33 (39.0%) | 34 (40.4%) | 4.02 |
| 15 | 5 (5.3%) | 5 (5.3%) | 19 (22.6%) | 23 (27.3%) | 32 (38.0%) | 3.82 |
| 16 | 0 | 1 (1.1%) | 2 (2.0%) | 25 (29.7%) | 54 (64.2%) | 4.57 |
| 17 | 11 (13.0%) | 6 (7.1%) | 32 (38.0%) | 12 (14.2%) | 23 (27.3%) | 3.29 |
| 18 | 32 (38.0%) | 10 (11.9%) | 13 (15.4%) | 10 (11.9%) | 19 (22.6%) | 2.73 |
| 19 | 1 (1.1%) | 0 | 7 (8.3%) | 14 (16.6%) | 62 (73.8%) | 4.59 |
| 20 | 70 (83.3%) | 6 (7.1%) | 3 (3.5%) | 5 (5.3%) | 0 | 1.35 |
| 21 | 2 (2.3%) | 0 | 1 (1.1%) | 15 (17.8%) | 66 (78.5%) | 4.66 |
| 22 | 0 | 0 | 3 (3.5%) | 19 (22.6%) | 62 (73.8%) | 4.64 |
| 23 | 1 (1.1%) | 1 (1.1%) | 7 (8.3%) | 28 (33.3%) | 47 (55.9%) | 4.35 |

Traditional Students

Definitely no responses. The question receiving the greatest response for "definitely no" was Question 20: "Should the older (nontraditional) students be in separate classes?" Of the 154 students responding, 107, or 69.4%, responded "definitely no" for separate classes.

The question receiving the lowest response for "definitely no" was Question 16: "Is your program broadening your outlook and experience?" Of the 154 students responding, 0, or 0%, responded "definitely no" to the results of their program.

Definitely yes responses. The question receiving the greatest response for "definitely yes" was Question 1, "Is your goal to complete the course requirements for a degree?" Of the 154 students responding, 117, or 74.9%, responded "definitely yes" for attaining a degree.

The question receiving the lowest response for "definitely yes" was Question 20: "Should the older (nontraditional) students be in separate classes?" Of the 154 students responding, 2, or 1.2%, responded "definitely yes" for having separate classes.

Nontraditional Students

Definitely no responses. The question receiving the greatest response for "definitely no" was Question 20:

"Should the older (nontraditional) students be in separate classes?" Of the 84 students responding, 70, or 83.3%, responded "definitely no" for having separate classes.

The question receiving the lowest response for "definitely no" was Question 19: "What is your reaction to the mix of older and younger students in many of the classes?" Of the 84 students responding, 1, or 1.1%, responded "definitely no" for the mix of older and younger students.

Definitely yes responses. The question receiving the greatest response for "definitely yes" was Question 21: "Are you satisfied with your decision to attend classes at The University of Akron?" Of the 84 students responding, 66, or 78.5%, responded "definitely yes" for their decision to attend classes at The University of Akron.

The question receiving the lowest response for "definitely yes" was Question 20: "Should the older (nontraditional) students be in separate classes?" Of the 84 students responding, 0, or 0%, not one wanted the separate classes.

Comparison of the Responses of the Traditional and Nontraditional Students to Questions 5 and 8

Question 5: "Do you find Bierce Library a valuable resource for information for your assignments?"

Traditional students. Of the 154 students, 6, or 3.8%, responded definitely no; 18, or 11.6%, responded moderately no; 29, or 18.8%, were not sure; 57, or 37%, responded moderately yes; and 44, or 28.5%, responded definitely yes. The mean was 3.76.

Nontraditional students. Of the 84 students, 7, or 8.3%, responded definitely no; 7, or 8.3%, said moderately no; 13, or 15.4%, were not sure; 24, or 28.5%, responded moderately yes; and 33, or 39%, responded definitely yes. The mean was 3.80. Results: 3.80 - 3.76 = .04, the least difference.

Question 8: "Do you actively participate in class discussions?"

Traditional students. Of the 154 students, 7, or 4.5%, responded definitely no; 30, or 19.4%, responded moderately no; 16, or 10.3%, were not sure; 67, or 43.5%, responded moderately yes; and 34, or 22%, responded definitely yes. The mean was 3.59.

Nontraditional students. Of the 84 students, 0, or 0%, responded definitely no; 5, or 5.9%, responded moderately no; 6, or 7.1%, were not sure; 21, or 25%, said moderately yes; and 52, or 61.9%, responded definitely yes. The mean was 4.38. Result: 4.38 - 3.59 = .79, the greatest difference.

## Results of the Study

Results of the specific research hypotheses are presented here in order to support or reject the two general hypotheses:

### General Hypotheses ($H_{G1}$-$H_{G2}$)

$H_{G1}$: There is a significant interaction between learning styles and student groups predicting types of test preferences, educational goals, and other responses related to educational activities.

$H_{G2}$: There is a significant difference between traditional and nontraditional students in their learning styles and in their questionnaire responses.

### Results of the Interaction Analysis Hypotheses ($H_1$-$H_{23}$)

The statistical results showed there was no significant interaction between the traditional and nontraditional groups and learning style in predicting individual responses of general questions for Items 1-23 (Table 16). In other words, the one independent variable (learning style) was not dependent on a second independent variable (age) in predicting questionnaire responses.

### Results of the Discriminant Analysis Hypotheses ($H_{24}$-$H_{27}$)

$H_{24}$: Learning style categories significantly discriminate between traditional and nontraditional students.

Table 16

Summary Table of 4x2 Categorical-Categorical Interaction Analysis (Type of Learner by Traditional/Nontraditional Student) in Predicting 23 Educational Preferences and Attitudes: $R^2$ Values, Degrees of Freedom, F Value, and Significance Level (N = 238)

| Hypothesis Number | Criterion[a] | $R_I^{2b}$ | $R_r^{2c}$ | $df_n/df_d$ | F | p |
|---|---|---|---|---|---|---|
| 1 | Is your goal to complete the course requirements for a degree? | .06349 | .05799 | 3/230 | .450253 | >.05 |
| 2 | Are you satisfied with your progress in the program you've chosen? | .07499 | .06604 | 3/230 | .741794 | >.05 |
| 3 | Do your class assignments require an excessive amount of time? | .04041 | .02422 | 3/230 | 1.2935 | >.05 |
| 4 | Are your assignments realistic for your needs and expectations? | .02811 | .02446 | 3/230 | .287927 | >.05 |
| 5 | Do you find Bierce Library a valuable resource for information for your assignments? | .03537 | .00482 | 3/230 | 2.42803 | >.05 |
| 6 | Do you react negatively to working several hours at the library? | .01615 | .00711 | 3/230 | .704444 | >.05 |
| 7 | Are you finding due dates for class assignments difficult to meet? | .08289 | .06147 | 3/230 | 1.79062 | >.05 |
| 8 | Do you actively participate in class discussions? | .13219 | .11768 | 3/230 | 1.28189 | >.05 |
| 9 | Do you prefer true and false test questions? | .03104 | .01022 | 3/230 | 1.64733 | >.05 |
| 10 | Do you prefer multiple choice test questions? | .03488 | .02553 | 3/230 | .74274 | >.05 |
| 11 | Do you prefer essay test questions? | .03422 | .01592 | 3/230 | 1.45271 | >.05 |
| 12 | Do you enjoy being involved in a brainstorming session? | .09254 | .08886 | 3/230 | .310904 | >.05 |
| 13 | Do you think higher education will prepare you to use your particular abilities? | .02242 | .00731 | 3/230 | 1.185 | >.05 |
| 14 | Is your program helping you to better understand yourself? | .03099 | .02319 | 3/230 | .617123 | >.05 |
| 15 | Do you feel you are pursuing a program that is preparing you for an environment where you can be creative and original? | .04939 | .02630 | 3/230 | 1.87873 | >.05 |
| 16 | Is your program broadening your outlook and experiences? | .08449 | .06250 | 3/230 | 1.84149 | >.05 |

Table (continued)

Table 16 (continued)

| Hypothesis Number | Criterion[a] | $R_Y^{2b}$ | $R_Y^{2c}$ | $df_n/df_d$ | F | p |
|---|---|---|---|---|---|---|
| 17 | Do your plans for the future include taking advanced courses at The University of Akron? | .03971 | .03851 | 3/230 | .095804 | >.05 |
| 18 | Are you preparing for a possible career change in the near future? | .03810 | .01963 | 3/230 | 1.47212 | >.05 |
| 19 | What is your reaction to the mix of older and younger students in many of the classes? | .06347 | .06186 | 3/230 | .13179 | >.05 |
| 20 | Should the older (nontraditional students be in separate classes? | .04093 | .02796 | 3/230 | 1.0368 | >.05 |
| 21 | Are you satisfied with your decision to attend classes at The University of Akron? | .13302 | .12905 | 3/230 | .351065 | >.05 |
| 22 | Would you recommend the learning opportunities available at The University of Akron? | .11601 | .11296 | 3/230 | .26452 | >.05 |
| 23 | Do you find the instructors and professors helpful? | .14983 | .13699 | 3/230 | 1.15789 | >.05 |

[a]1 = definitely no
2 = moderately no
3 = not sure
4 = moderately yes
5 = definitely yes

[b]Predictor variables in the full model are the unit vector, error vector, and the following:

traditional x converger
nontraditional x converger
traditional x diverger
nontraditional x diverger
traditional x assimilator
nontraditional x assimilator
traditional x accommodator
nontraditional x accommodator

[c]Predictor variables in the restricted model are the unit vector, the error vector, the main effects of student group (traditional or nontraditional), and learning style type (converger, diverger, assimilator, accommodator).

Results of Hypothesis 24 indicate that learning styles do discriminate between traditional and nontraditional students ($R_f^2$ = .09457, significant at .05). See Table 17 for detailed results.

$H_{25}$: Learning style categories significantly discriminate between traditional and nontraditional students independent of questionnaire responses and sex.

Results of Hypothesis 25 indicate that learning styles continue to discriminate between traditional and nontraditional students when controlling for questionnaire responses ($R_f^2$ = .47518, significant at .05). See Table 18 for detailed results.

$H_{26}$: Questionnaire responses significantly discriminate between traditional and nontraditional students.

Results of Hypothesis 26 indicate that the questionnaire responses discriminated between the two groups ($R_f^2$ = .41629, significant at .05). See Table 19 for detailed results.

$H_{27}$: Questionnaire responses significantly discriminate between traditional and nontraditional students over and above learning style and sex.

Results of Hypothesis 27 indicate that the questionnnaire responses discriminated between the two groups even when controlling for differences in learning style and sex ($R_f^2$ = .47518, significant at .05). See Table 20 for detailed results.

Table 17

Results for Hypothesis 24

| Models and Explanations | $R^2$ | $\frac{df_n}{df_d}$ | Alpha | F | p | S/NS |
|---|---|---|---|---|---|---|
| Hypothesis 24. Learning style categories significantly discriminate between traditional and nontraditional students. | | | | | | |
| Full Model: $Y_1 = (.7722)U + (-.8250)X_1$ $(-.1092)X_2 + (.0000)X_3 +$ $(-.4307)X_4 + E$ | .09457 | | | | | |
| Restricted Model: $Y_1 = a_oU + E$ | .00000 | 3/234 | .05 | 8.14691 | <.05 | S |

Note. See list of variables on page 64.

Table 18

Results for Hypothesis 25

| Models and Explanations | $R^2$ | $df_n/df_d$ | Alpha | F | p | S/MS |
|---|---|---|---|---|---|---|
| Hypothesis 25. Learning style categories significantly discriminate between traditional and nontraditional students independent of questionnaire responses and sex. | | | | | | |
| Full Model: $Y_1 = (1.7580)U + (-.3667)X_1 + (-.7542)X_2 + (.0000)X_3 + (-.2521)X_4 + (.1074)X_5 + (-.2317)X_6 + (.4832)X_7 + (.3536)X_8 + (.2022)X_9 + (-.8041)X_{10} + (-.7448)X_{11} + (-.1008)X_{12} + (-.2845)X_{13} + (.4273)X_{14} + (-.1156)X_{15} + (-.4665)X_{16} + (-.1782)X_{17} + (.7078)X_{18} + (.3911)X_{19} + (-.3827)X_{20} + (.4477)X_{21} + (-.4342)X_{22} + (-.5656)X_{23} + (-.4984)X_{24} + (-.9677)X_{25} + (-.5864)X_{26} + (-.5268)X_{27} + (.2187)X_{28} + (.0000)X_{29} + E$ | .47518 | 4/210 | .05 | 2.73394 | <.05 | S |
| Restricted Model: $Y_1 = (1.7656)U + (.1107)X_1 + (-.2534)X_2 + (.5673)X_3 + (.3344)X_4 + (.2074)X_5 + (-.1318)X_6 + (-.7052)X_7 + (-.1108)X_8 + (-.3064)X_9 + (.4895)X_{10} + (-.4245)X_{11} + (-.4743)X_{12} + (-.1598)X_{13} + (.1081)X_{14} + (.3579)X_{15} + (-.4867)X_{16} + (.3683)X_{17} + (-.3011)X_{18} + (-.4126)X_{19} + (-.4417)X_{20} + (-.1121)X_{21} + (-.3645)X_{22} + (-.6080)X_{23} + (.2273)X_{24} + (.2274)X_{25} + (.0000)X_{26} + E$ | .44785 | | | | | |

Note. See list of variables on page 64.

Table 19

Results for Hypothesis 26

| Models and Explanations | $R^2$ | $df_n/df_d$ | Alpha | F | p | S/NS |
|---|---|---|---|---|---|---|
| Hypothesis 26. Questionnaire responses significantly discriminate between traditional and nontraditional students. | | | | | | |
| Full Model: $Y_1 = (1.867)U + (.1088)X_1 + (-.3896)X_2 + (.4925)X_3 + (.3524)X_4 + (.2931)X_5 + (-.4518)X_6 + (-.7769)X_7 + (-.9794)X_8 + (-.2357)X_9 + (.4893)X_{10} + (.1574)X_{11} + (-.4607)X_{12} + (-.2247)X_{13} + (-.2520)X_{14} + (.4584)X_{15} + (-.5039)X_{16} + (.2632)X_{17} + (-.4374)X_{18} + (-.5191)X_{19} + (-.4888)X_{20} + (-.1067)X_{21} + (-.6310)X_{22} + (-.5291)X_{23} + E$ | .41629 | | | | | |
| Restricted Model: $Y_1 = (.0000)U + E$ | .00000 | 22/215 | .05 | 6.96971 | < .05 | S |

Table 20

Results for Hypothesis 27

| Models and Explanations | $R^2$ | $df_n/df_d$ | Alpha | F | p | S/NS |
|---|---|---|---|---|---|---|
| Hypothesis 27. Questionnaire responses significantly discriminate between traditional and nontraditional students over and above learning style and sex. | | | | | | |
| Full Model: $Y_1 = (1.7580)U + (-.3667)X_1 + (-.7542)X_2 + (.0000)X_3 + (-.2521)X_4 + (.1074)X_5 + (-.2317)X_6 + (.4832)X_7 + (.3536)X_8 + (.2022)X_9 + (-.8041)X_{10} + (-.7448)X_{11} + (-.1008)X_{12} + (-.2843)X_{13} + (.4273)X_{14} + (-.1156)X_{15} + (-.4665)X_{16} + (-.1782)X_{17} + (.7078)X_{18} + (.3911)X_{19} + (-.3827)X_{20} + (.4477)X_{21} + (-.4342)X_{22} + (-.5656)X_{23} + (-.4984)X_{24} + (-.9677)X_{25} + (-.5864)X_{26} + (.5268)X_{27} + (.2187)X_{28} + (.0000)X_{29} + E$ | .47518 | | | | | |
| Restricted Model: $Y_1 = (.7356)U + (-.8695)X_1 + (-.1851)X_2 + (.0000)X_3 + (-.4314)X_4 + (.1700)X_5 + (.0000)X_6 + E$ | .11554 | 22/211 | .05 | 6.57230 | <.05 | S |

## Post Hoc Analysis

From testing the data by discriminant analysis and investigating partial regression weights (Hypotheses 26 and 27) it seemed that seven items of the questionnaire had the most discriminating power. Therefore, post hoc analysis was done to determine if these seven items significantly discriminated over and above learning style information. The seven items of the questionnaire listed (7, 8, 12, 16, 20, 22, and 23) implications significantly differentiated between traditional and nontraditional students independent of their learning style.

## Correlation Analysis

The initial plan for statistical analysis (Chapter III) did not include the Pearson Product Moment correlation analysis. However, it seemed appropriate to include this analysis for further clarification in this study. Constructing a correlation matrix between learning styles and the 23 questionnaire items was carried out to show the strength and direction of the relationships between the items and learning styles. Therefore, these findings and conclusions are included in Chapter V.

Pearson Product Moment correlations were calculated between the four learning styles and the responses to the questionnaire items (see Table 23).

Table 23

Relationships Between Learning Style Categories and Each of the 23 Questionnaire Items

| Item | Converger | Diverger | Assimilator | Accommodator |
|---|---|---|---|---|
| 1 | 0.0340 | 0.0953 | -0.0916 | -0.0374 |
| 2 | 0.0336 | -0.0891 | -0.0423 | 0.1379* |
| 3 | 0.0576 | 0.0105 | 0.0401 | -0.1133* |
| 4 | -0.0413 | 0.0673 | -0.1119* | 0.0890 |
| 5 | -0.0381 | 0.0618 | -0.0393 | 0.0029 |
| 6 | -0.0133 | -0.0593 | 0.0495 | 0.0258 |
| 7 | 0.0581 | 0.1377* | -0.0464 | -0.1688* |
| 8 | 0.0297 | -0.0890 | -0.0702 | 0.1759* |
| 9 | -0.0352 | 0.0086 | -0.0010 | 0.0207 |
| 10 | 0.0115 | 0.0245 | 0.0532 | -0.1076* |
| 11 | 0.0830 | -0.0654 | -0.0098 | 0.0242 |
| 12 | 0.1004 | -0.0536 | -0.0918 | 0.0961 |
| 13 | 0.0277 | 0.0320 | -0.0621 | 0.0125 |
| 14 | -0.0706 | 0.0379 | -0.0528 | 0.0784 |
| 15 | 0.0360 | 0.0907 | -0.1247* | 0.0080 |
| 16 | 0.0005 | 0.1016 | -0.1996* | 0.1183* |
| 17 | -0.0872 | 0.0674 | -0.1266* | 0.1471* |
| 18 | 0.0447 | 0.0224 | -0.1027 | 0.0605 |
| 19 | 0.0466 | -0.0925 | 0.0538 | 0.0110 |
| 20 | -0.0747 | 0.1438* | -0.0129 | -0.1035 |
| 21 | -0.0631 | 0.0221 | -0.1515* | 0.2152* |
| 22 | -0.0543 | -0.0056 | -0.1016 | 0.1808* |
| 23 | -0.0992 | 0.0978 | -0.1669* | 0.1687* |

*These correlations are significant; however, they have not been corrected for multiple comparisons and therefore should be interpreted with great caution.

Converger learners. According to Kolb (1976), these learners seem to do best in situations like conventional intelligence tests, where there is just one right answer or just one solution to a problem. They focus on specific problems through hypothetical-deductive reasoning. They are unemotional and prefer to deal with things rather than people. There were no significant correlations between the learning style of the younger students and responses to any of the questionnaire items.

Diverger learners. According to Kolb, these learners are exact opposites of convergers. They view everything from many angles, then organize them into a meaningful "gestalt." They are imaginative and often excel as "brainstormers"; they are inclined to be emotional. The diverger learning style was significantly related to the following two questionnaire items. Positive correlations were obtained.

Item 7: Are you finding due dates for class assignments difficult to meet?

Item 20: Should the older (nontraditional) students be in separate classes?

A positive value of r indicates that there is a tendency for high values of one variable (X = traditional students) to be associated with high values of the other variable (Y = nontraditional students) and low values of the one to be associated with low values of the other.

Assimilator learners. According to Kolb, these learners are best at taking data and devising theoretical models. They are also very good at inductive reasoning, and bringing together different observations into an integrated explanation. The assimilator learning style was significantly related to the following six questions. Negative correlations were obtained.

Item 4: Are your assignments realistic for your needs and expectations?

Item 15: Do you feel you are pursuing a program that is preparing you for an environment where you can create and be original?

Item 16: Is your program broadening your outlook and experience?

Item 17: Do your plans for the future include taking advanced classes at The University of Akron?

Item 21: Are you satisfied with your decision to attend classes at The University of Akron?

Item 23: Do you find the instructors and professors helpful?

A negative value of r indicates that high values of X (traditional students) are associated with low values of Y (nontraditional students) and vice versa.

Accommodator learners. According to Kolb, these learners do well in situations where they must accommodate themselves to the circumstances. If their theories and plans do not fit the facts they will toss them aside and find another approach. They take more risk than the other

three learning styles. They capitalize on their three greatest strengths: (a) carrying out plans and experiments, (b) getting involved in new and challenging experiences, and (c) solving problems on a trial-and-error basis. The accommodator learning style was significantly related to the following 10 questions. The correlations obtained were positive for Items 2, 8, 16, 17, 21, 22, and 23.

Item 2: Are you satisfied with your progress in the program you have chosen?

Item 8: Do you actively participate in class discussions?

Item 16: Is your program broadening your outlook and experience?

Item 17: Do your plans for the future include taking advanced classes at The University of Akron:

Item 21: Are you satisfied with your decision to attend classes at The University of Akron?

Item 22: Would you recommend the learning opportunities available at The University of Akron?

Item 23: Do you find the instructors and professors helpful?

To further clarify the understanding of these items, it was decided to include an explanation of positive correlation as it relates to this study.

> A positive value of r indicates that there is a tendency for high values of one variable (X = traditional students) to be associated with high

> values of the other variable (Y = nontraditional students) and low values of the one to be associated with low values of the other. (Minium, 1970, p. 143)

Negative correlations were obtained for Items 3, 7, and 10.

> Item 3: Do your class assignments require and excessive amount of time?
>
> Item 7: Are you finding due dates for class assignments difficult to meet?
>
> Item 10: Do you prefer multiple-choice test questions?

An explanation of a negative correlation (Minium, 1970) is as follows:

> A negative value of r indicates that high values of X (traditional students) are associated with low values of Y (nontraditional students). The reverse is also true, a negative value of r indicates that low values of X (traditional students) are associated with high values of Y (nontraditional students). (p. 144)

It should be noted here that the Kolb Learning Style Inventory (LSI) was designed to measure learning styles. This purpose is different from that of the questionnaire. Test preferences, educational goals, and reactions to other factors were sought from the learning environment. The analysis of the data indeed indicated that these two instruments measured different characteristics.

## Conclusions

This study showed that nontraditional students over 50 years of age are responding to the requirements of higher education in a manner similar to their counterparts, the traditional students. The results of the first statistical treatment, multiple linear regression, showed similar responses in learning styles from both traditional and nontraditional students. However, additional statistical treatment, Discriminant Analysis, indicated a significant difference existed between traditional and nontraditional students with regard to learning styles and questionnaire responses. Both traditional and nontraditional students preferred being in classes together.

General questionnaire responses from nontraditional students were either "definitely yes" or "definitely no." Relatively few responses were "moderately no" or "moderately yes" and only once was "not sure" the predominant response. This strong determination has been observed by the researcher in classroom sitautions.

With regard to questions about classroom assignments, older learners related that they handled assignments quickly with little reluctance. In the classroom, an assignment requiring extra time in the library is often completed as speedily as a daily assignment by older students.

Nontraditional students responded more favorably than traditional students to brainstorming sessions in which they are able to share their wealth of working and living experiences.

Based on previous studies, the researcher expected a greater indication of Accommodators (do well in situations where they must accommodate themselves to the circumstances) among the traditional students in the LSI; instead, the results showed a greater number of Divergers (they look at everything from many perspectives and organize them into a meaningful "gestalt").

## Implications

Adult education theory may be influenced by this study. The researcher acknowledges the limitations of the study; particularly with regard to the self-selection nontraditional students, the following implications evolved from the study:

An unexpected result in the study was the small .03 unique variance accounted for by the LSI, whereas the questionnaire responses accounted for .36 variance. This finding is different from other studies (Hooper, 1981) and may reflect the influence of an urban campus where traditional students are most often career oriented and working part-time. The fact that this nontraditional population was enrolled in credit courses may represent a unique

## REFERENCE NOTE

1. Guzzetta, D. J. Address to the faculty. Presentation given to the faculty of The University of Akron, Akron, Ohio, September 1979.

REFERENCES

Adult Resources Center training manual. Akron, Ohio: University of Akron, 1982.

Allen, D. W., & Rossman, M. H. A perspective on life-long learning. Community Education Journal, 1975, 5(5), 31-33.

Atchley, R. C. The social forces in later life: An introduction to social gerontology. Belmont, California: Wadsworth Publishing Company, 1972.

Baltes, P. B., & Shaie, K. W. On the plasticity of intelligence in adulthood and old age. American Psychologist, 1976, 31(10), 720-725.

Bass, R. K. Personalization of instruction based upon cognitive style mapping: Implications for educational gerontology. Educational Gerontology, 1978, 3(2), 109-124.

Belbin, E. Methods of training older workers. Ergonomics, 1958, 2, 207-221.

Birren, J. E., & Clayton, V. History of gerontology. In D. S. Woodruff & J. Birren (Eds.), Aging: Scientific perspectives and social issues. New York: Van Nostrand Reinhold, 1975.

Birren, J. E., & Woodruff, D. S. Human development over the life span through education. In P. Balte & K. W. Schaie (Eds.), Life span developmental psychology. New York: Academic Press, 1973.

Bloom, B. Human characteristics and school learning. New York: McGraw-Hill Book Company, 1976.

Bolton, E. B. Cognitive and noncognitive factors that affect learning in older adults and their implications for instruction. Educational Gerontology, March 1978, pp. 331-344.

Botwinick, J. Aging and behavior. New York: Springer Publishing Company, 1973.

Botwinick, J. Intellectual abilities. In J. E. Birren & K. W. Schaie (Eds.), Handbook of the psychology of aging. New York: Van Nostrand Reinhold, 1977.

Bowen, H. R. The state of the nation and the agenda for higher education. AAHE Bulletin, 1982, 34(8), 1, 6-9.

Cawley, R. W. V., Miller, S. A., & Milligan, J. N. Cognitive styles and the adult learner. Adult Education, 1976, 26(2), 101-116.

Chickering, A. W. Adult development: Implications for teaching and learning. Community Services Catalyst, 1981, 9(2).

Clark, B. R. The cooling-out function in higher education. American Journal of Sociology, 1960, 65(6), 569-576.

Claxton, C., Adams, D., & Williams, D. Using student learning styles in teaching. AAHE Bulletin, 1982, 34(9), 1, 7-10.

Comfort, A. A good age. San Francisco: Jossey-Bass, 1977.

Covey, H. C. American higher education and older people. Educational Gerontology, 1981, 373-383.

Cronbach, L. J., & Snow, R. E. Aptitudes and instructional methods. New York: Irvington Publishers, Inc., 1977.

Cross, K. P. Accent on learning. San Francisco: Jossey-Bass, 1976.

Cross, K. P. Adult learners: Characteristics, needs and interests. In R. E. Peterson (Ed.), Lifelong learning in America. San Francisco: Jossey-Bass, 1979.

Cross, K. P. Why adults participate and why not. In Adults as learners. San Francisco: Jossey-Bass, 1981.

Dixon, J. C. (Ed.). Continuing education in the later years. Gainesville, Florida: University of Florida Press, 1963.

Dixon, N. Incorporating learning style into training design. Training and Development Journal, July 1982, 64.

Dunn, R., & Dunn, K. Teaching students through their individual learning styles. Reston, Virginia: Reston Publishing, Inc., 1978.

Fordham, F. An introduction to Jung's psychology. Middlesex, England: Penguin Books, 1966.

Hagberg, J. O., & Leider, R. J. The inventures: Excursions in life and career renewal. Reading, Maine: Addison-Wesley Publishing Company, 1978.

Havighurst, R. J. Education through the adult lifespan. Educational Gerontology, 1975, 15(5), 448-451.

Helling, J. F., & Bauer, B. M. Seniors on campus. Adult leadership, 1972, 21(6), 203-205.

Hendrick, A. The role of universities in the education of the aged. Adult Education, 1962, 12(3), 162-164.

Hendrickson, A., & Barnes, R. F. A great university studies educational needs of older people. Adult Leadership, 1967, 16(1), 2-4, 32.

Hiemstra, R. Older adult learning: Instrumental and expressive categories. Educational Gerontology, 1976, pp. 227-236.

Hill, J. E., & Nunnery, D. N. Personalizing educational programs utilizing cognitive style mapping. Bloomfield Hills, Michigan: Oakland Community College Press, 1974.

Hodgkinson, H. Guess who's coming to college: New learners, new tasks. NASPA Journal, 1976, 2-14.

Holtzclaw, L. R. The adult learner's need for inner freedom. Lifelong Learning: The Adult Years, September 1979, pp. 18-19, 24.

Holzman, P. S., & Klein, G. S. Cognitive system-principles of leveling and sharpening: Individual differences in assimilation effects in visual time error. Journal Psychology, 1954, 37, 105-122.

Hooper, J. O. Older adults earning university credits: A description. Educational Gerontology, 1981, 6, 385-394.

Hooper, J. O., & Marsh, G. B. A study of older students attending university classes. Educational Gerontology, 1978, 3, 321-330.

Hunt, D. E. Conceptual level theory and research as guides to educational practice. Interchange, 1977-78, 4, 78-90.

Keefe, J. W. Learning style: An overview. In Student learning styles. Reston, Virginia: National Association of Secondary School Principals, 1979.

Kerlinger, F. N. Foundations of behavioral research. New York: Holt, Rinehart & Winston, Inc., 1963.

Kirby, P. Cognitive style, learning style, and transfer skill acquisition. Columbus, Ohio: The National Center for Research in Vocational Education, The Ohio State University, 1979.

Klecka, W. R., Nie, N. H., & Hull, C. H. Statistical package for the social sciences primer. New York: McGraw-Hill, Inc., 1975.

Knowles, M. S. The leader looks at the learning climate. In G. L. Lippitt, L. E. This, & R. G. Bidwell (Eds.), Optimizing human resources. Reading, Massachusetts: Addison-Wesley Publishing Co., 1971.

Knowles, M. The emergence of a theory of adult learning: Androgyny. In The adult learner: A neglected species. Houston: Gulf Publishing Company, 1978.

Knox, A. B. Adult development and learning. San Francisco: Jossey-Bass, 1977.

Kolb, D. A. Learning Style Inventory: Technical manual. Boston: McBer & Company, 1976.

Leckie, S. The new student on campus. Educational Horizons, Summer 1978, pp. 196-199.

Messick, S. Individuality in learning. San Francisco: Jossey-Bass Publishers, 1976.

McCullough, K. O. Adult individuality: Real or imagined? Lifelong learning: The adult years, April 1979, pp. 12-15, 30.

McKenney, J. L., & Keen, P. G. W. How managers' minds work. Harvard Business Review, 1974, 53(3), 79-90.

McNeil, K. A., Kelly, F. J., & McNeil, J. T. Testing research hypotheses using multiple linear regression. Carbondale: Southern Illinois University Press, 1975.

Miller, W. C. What will the future bring to education. Phi Delta Kappan, December 1978, pp. 287-289.

Minium, E. W. Statistical reasoning in psychology and education. New York: John Wiley & Sons, 1970.

Newman, I. Suggested format for the presentation of multiple regression analysis. Multiple Linear Regression Viewpoints, 1972, 2(4).

Newman, I., & Newman, C. Conceptual statistics for beginners. Washington: University Press, 1977.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. Statistical package for the social sciences. New York: McGraw-Hill Book Company, 1975.

Nunnally, J. C. Psychometric theory. New York: McGraw-Hill Book Company, Inc., 1967.

Peterson, D. A. Life-span education and gerontology. Gerontologist, 1975, 15, 436-441.

Peterson, D. A. Participation in education by older people. Educational Gerontology, 1981, 7(2-3), 245-256.

Peterson, D. A. Toward a definition of educational gerontology. In R. H. Sherron & D. B. Lumsden (Eds.), Introduction to educational gerontology. Washington, D.C.: Hemisphere Publishing Company, 1978.

Peterson, D. A., & Eden, D. Z. Cognitive style and the older learner. Educational Gerontology, July 1981, pp. 57-66.

Peterson, R. E. Opportunities for adult learners. In A. W. Chickering (Ed.), Modern American colleges. San Francisco: Jossey-Bass, 1981.

Pigg, K. E., Busch, L., & Lacy, W. B. Learning styles in adult education: A study of county extension agents. 1980 Adult Education, 1980, 30(4), 233-244.

Rauch, D. B. Education for the growing majority: Adults. Lifelong Learning: The Adult Years, September 1981.

Robinson, J. Oldies but goodies. Journal of National Association of Women Deans and Counselors, Spring 1980, pp. 27-32.

Rodehaver, M. B., Axtell, W. B., & Gross, R. E. The sociology of the school. New York: Thomas Crowell, 1957.

Sakata, R., & Fendt, P. F. Learning capacity and the older adult. Lifelong Learning: The Adult Years, June 1981, pp. 10-13.

Schaie, K. W., & Parr, J. Intelligence. In A. W. Chickering (Ed.), Modern American colleges. San Francisco: Jossey-Bass, 1981.

Smith, R. M., & Haverkamp, K. K. Toward a theory of learning how to learn. 1977 Adult Education, 1977, 28, 3-21.

Strange, C. C. Intellectual development, motive for education and learning styles during the college years: A comparison of adult and traditional-age college

students. Unpublished doctoral dissertation, The University of Iowa, 1978.

Three months around the round table. Bulletin of the Association of American Colleges, 1935, 21(4), 619.

Tice, C. H. How will we score when red, white, and blue turn to gray? The ultimate accountability. Educational Leadership, January 1979, pp. 284-286.

Wass, H., & West, C. A. A humanistic approach to education of older learners. Journal of Educational Gerontology, 1977, pp. 407-416.

Wasserman, I. M. The educational interests of the elderly. Journal of Educational Gerontology, 1976, pp. 323-330.

Weg, R. B. Educational intervention and gerontology: An integration. Gerontologist, 1975, 15(5), 448-451.

Zemke, R., & Zemke, S. 30 things we know for sure about adult learning. Training/HRD, June 1981, pp. 45-49.

## APPENDIX A

LETTER REQUESTING PERMISSION TO USE

LEARNING STYLE INVENTORY

# THE UNIVERSITY OF AKRON
AKRON, OHIO 44325

Division of Business and
Office Technology
Community and Technical College
Phone: (216) 375-7378


April 12, 1982

Dr. David A, Kolb
Department of Organizational Behavior
The Weatherhead School of Management
Case Western Reserve University
Cleveland, OH 44106

Dear Dr. Kolb:

I am requesting permission to use your Learning Style Inventory (LSI), tests, charts, graphs, and other perinent information contained in the Technical Manual. This information will be used in my dissertation for the Department of Educational Administration -- The University of Akron, Akron Ohio.

Dissertation title; "A Comparative Study of the Learning Styles and Other Related Factors for Traditional and Non-traditional Students on the Campus of The University of Akron."

Sincerely,

Isabel E. Rush
Graduate Assistant/Doctoral Candidate

IER/sjo

Request granted
David A. Kolb
7/14/82

## APPENDIX B

LETTERS TO STUDENTS REQUESTING

PARTICIPATION IN STUDY

April 5, 1982

Dear Student:

We are writing to invite you to participate in a study involving traditional and nontraditional students enrolled in the various colleges of The University of Akron. This study is being conducted by Isabel Rush, a graduate student in the Department of Educational Administration, as part of her doctoral dissertation.

The focus of this study is to determine the learning style elements characteristic of traditional and nontraditional students. During the survey you will be asked to complete three tasks: a learning style inventory, a general questionnaire, and a demographic questionnaire. The learning style inventory is a short check-off form designed to reveal your preferred and most effective style of learning. The general questionnaire will focus on your reactions to college; the demographic questionnaire will give a brief profile of you. The three questionnaires will require 20 minutes or less to completed.

All responses will be kept strictly confidential. Individual student's names will not appear on any questionnaire or in any written report; all results will be reported only in summary. The results of this study will be sent to you early this fall.

Within the next few days you will be contacted by telephone to schedule a time convenient for you to complete the forms. We hope you will be able to participate. The knowledge you gain concerning your own learning style should be interesting and helpful. If you have any questions concerning the study, please feel free to contact Isabel Rush at 214 Schrank Hall South, 375-7722 or at home, 928-6398. Thank you in advance for your participation.

Sincerely,

Isobel L. Pfeiffer
Professor of Education
Educational Administration

Isabel E. Rush
Doctoral Candidate
Educational Administration

April 5, 1982

Dear Student:

As I do not have your telephone number, I am including this note with the cover lettter. A specific place has been designated for testing the older students. The place is room 214 on the second floor of Schrank Hall South, on the southwest corner of the university campus. Testing is available for three weeks, April 12 to April 30, Monday through Thursday, 8:00 a.m. - 8:00 p.m., and Friday, 8:00 a.m. - 4:00 p.m. The choice of the day and time is yours.

Please indicate the day and the approximate time you have selected on the lower portion of this paper, including your name, and return in the enclosed stamped, self-addressed envelope.

I am looking forward to meeting you at the time you have selected for your testing.

Sincerely,

Isabel E. Rush
Doctoral Candidate

Name_____

My choice for testing is_____